

COST-EFFECTIVE MULTI-CHIP ASSEMBLY MANUFACTURING CAPABILITY AVAILABLE



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Payoff

The M/A-COM foundry provided high-performance multi-chip assemblies at a fraction of the cost even before the automated line was in operation. They have demonstrated the ability to ramp-up production quickly by successfully manufacturing more than 900 radio transceivers in a few weeks.

Accomplishment

Under contract with the Air Force Research Laboratory's (AFRL's) Sensors Directorate (SN) and funded by the Defense Advanced Research Projects Agency (DARPA), an independent merchant foundry capability with commercial applications was developed to assemble cost-effective microwave multi-chip assemblies for the Department of Defense. By leveraging commercial practices, M/A-COM of Lowell, MA, successfully reduced the cost of front-end development time for multi-chip assemblies by 300 percent and production cost by 500 percent. The foundry line is fully operational and available to industry manufacturing multi-chip assembly designs.

Background

Fabrication of multi-chip assemblies, for military applications, is very expensive because of the small quantity produced and the labor intensive manufacturing processes in place. Additionally, research and development (R&D) costs were high since each multi-chip assembly went through the complete R&D process before manufacturing began. As a result, the economic viability of producing low-cost multi-chip assemblies depended on a foundry automating its manufacturing system. The DARPA program focused on developing an independent merchant foundry leveraging high-volume commercial line processes and standards, which significantly reduced the development time and cost for future military systems. M/A-COM already had a rich history in fabricating commercial digital and low frequency multi-chip assemblies. Under this contract, M/A-COM developed low-cost, high-speed manufacturing techniques optimized for each level of integration of microwave and millimeter wave assemblies. Robust automated manufacturing processes were invented, which were based on equipment and standards proven effective in the commercial market. M/A-COM used these processes to offer a full range of technical innovations focused on increasing frequency performance of multi-chips and their interconnects. The assembly line's open architecture and software structures enhance its capabilities to easily move from one assembly operation to another. Some of the innovative high-performance, low-cost technologies developed were: flip-chip interconnects, reliability without hernicticity (RWOH) coatings, mixed technology for multichip assemblies, advanced laminate boards, and microwave ball grid arrays. Some of the military products produced on the assembly line are ALO 135 amplifiers for electronic warfare, integrated defensive electronic counter measures (IDECM) drivers and RF converters for the airborne self-protection jammer (ASPJ), and multi-chip assemblies for combat identification of dismounted soldier (CIDDS). Commercial products produced include global positioning systems, wireless communications, local multi-point distribution systems (LMDS) for television, and a high-volume automotive radar (77 GHz) application.